

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1

JFK Federal Building, Boston, MA 02203-2211

RCRA RECORDS CENTER

FACILITY Aerovox Inc

I.D. NO. MA0062313777

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OTHER (P-1)

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SUBJ: Screening Risk Evaluation for workers exposed to PCBs on building surfaces at the Aerovox Facility, New Bedford, MA

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BACKGROUND

The Aerovox facility has manufactured electrical components including capacitors since 1938. Beginning in the 1940s, PCBs were used in the oil inserted into capacitors as a liquid insulating material. The first PCB mixture to be used in capacitors was Aroclor 1254, which was later replaced with Aroclor 1242 and finally with Aroclor 1016. Use of PCBs at the Aerovox facility ended in 1979 when PCBs were banned in the United States. The Aerovox company currently manufactures capacitors which do not contain PCBs. PCBs, however, are very stable compounds that can persist for years when released into the environment, therefore workers currently employed at the Aerovox facility could be exposed to PCBs on surfaces which were deposited there over twenty years ago.

PCBs are very toxic chemicals that have been shown to produce a variety of adverse health effects in animals and humans. In 1996, EPA completed a reassessment of the carcinogenicity of PCBs. This reassessment was peer reviewed by fifteen of the top PCB experts in the country including scientists from government, academia and industry. The reassessment confirmed that PCBs are probable human carcinogens. The International Agency for Research on Cancer has also declared PCBs to be probable human carcinogens. The National Toxicology Program has stated that it is reasonable to conclude that PCBs are carcinogenic in humans. Also the National Institute for Occupational Safety and Health has determined that PCBs are potential *occupational carcinogens*. EPA also has found clear evidence that PCBs have significant toxic effects in animals on the immune, reproductive, nervous and endocrine systems. The regulation of these systems is complex and may be interrelated. Studies in humans provide further support for the serious noncarcinogenic health effects related to exposure to PCBs.

Exposure of workers to PCBs may occur through inhalation, ingestion and dermal contact. PCBs spilled in a building, such as the Aerovox facility, can be distributed into other areas in a number of ways, such as through ventilation equipment or duct work, or by tracking. Industrial equipment and other non-structural materials such as clothing also can become contaminated. The major route of exposure to workers at the Aerovox facility is expected to be through dermal

contact and accidental ingestion of PCB contaminated dust on surfaces.

Six hundred employees work three shifts at the Aerovox facility. The facility is a three-floor brick building containing approximately 450,000 square feet and housing office, manufacturing and distribution activities. On May 29, 1997, EPA inspected the Aerovox Facility for compliance with TSCA. During the inspection, heavy oil stains were observed in several areas, including the impregnation tank room and a nearby capacitor degreasing room. In June, 1997, EPA inspectors collected shavings from the wood floor of the impregnation tank room. Twenty samples were collected and results indicated that these wood shavings contained PCB concentrations ranging from 1,180 to 31,000ppm. Shortly after this, Aerovox collected 93 samples from surfaces and six air samples in the Aerovox facility to determine the extent and magnitude of the PCB contamination.

The following is an evaluation of the potential exposure and risk to current employees of the Aerovox facility based on results of the surface sampling performed by the Aerovox company. If you have any questions about this evaluation, do not hesitate to call me at 223-5528.

## **RISK ASSESSMENT METHODOLOGY**

### **Data Assessment**

In October, 1997, Aerovox collected 93 wipe samples from surfaces in work areas on the first, second and third floors of the Aerovox facility and analyzed them for PCBs. The areas sampled included the pump room, cafeteria, tank room, impregnation room, final test area, vending machines, etc. The surfaces sampled included floors, lockers, beams, tables, ceilings, tank exteriors, desks, and walls. The results from this sampling effort are presented in **Table 1**.

**Sample methodology:** The wipe sample protocol followed was purported to be in accordance with "Verification of PCB Spill Cleanup by Sampling and Analysis," EPA-560/5-85-026, August, 1998. NIOSH Method 5503 was used for air sampling.

**Analytical Methodology:** According to the laboratory results, wipe samples were extracted with 10ml of hexane on a wrist shaker for 60 minutes. The extracts were screened on a 15m, DB-5 capillary column using a Perkin Elmer 8500 gas chromatograph. Qualitative and quantitative analyses were done on a dual capillary system, Hewlett Packard 5890 gas chromatograph with two 30m, DB-1701 and DB-5, 0.23mm ID and a 0.25 micron film thickness. The analytical method for the air samples was NIOSH 5503, gas chromatograph with electron capture detector.

### **Risk Assessment Equations**

Currently no consistent national EPA guidance exists for the estimate of risks from wipe samples. In addition, there is a fair amount of uncertainty in the ability of wipe samples to represent an individual's exposure and thus risk to contaminated surfaces. This is due to differences in collection efficiencies and uncertainties regarding exposure parameters. Collection efficiency may vary due to differences in applied pressure, sampling time and type of surface,

among other factors<sup>1</sup>. In addition, there is little data to support values for exposure parameters such as; how often an individual touches surfaces, how much of the skin is exposed, how much of the contaminated material on the walls stick to the skin, etc. However, wipe samples are the only current measure of indoor building contamination in the Aerovox facility. In addition, EPA Regions II and III have recently applied a risk method for using wipe samples to generate a range of target goals for PCBs on surfaces. Thus an evaluation of risk and corresponding target levels based on wipe samples is developed here applying the recent risk methodology developed by Region III. The equation for estimating potential risks from the accidental ingestion and dermal absorption of chemicals on building surfaces is presented below.

## EXCESS CANCER RISK AND HAZARD CALCULATIONS

**Excess Cancer Risk = oral risk + dermal Risk**

$$= [C_{\text{wipe}} \times 1\text{mg}/1000\text{ug} \times \text{FTSS} \times \text{SA} \times \text{FTSM} \times \text{CF} \times \text{ABS}_o \times \text{F} \times \text{D} \times \text{CPF}_o / \text{BW} \times \text{AT}] + [C_{\text{wipe}} \times 1\text{mg}/1000\text{ug} \times \text{FTSS} \times \text{SA} \times (1-\text{FTSM}) \times \text{CF} \times \text{ABS}_d \times \text{F} \times \text{D} \times \text{CPF}_o / \text{BW} \times \text{AT}]$$

*Where;*

$C_{\text{wipe}}$  = concentration of PCBs in wipe sample (ug/100cm<sup>2</sup>)(95UCL)

FTSS = fraction transferred from surface to skin (unitless)

SA = exposed surface area (cm<sup>2</sup>)

FTSM = fraction transferred from skin to mouth (unitless)

CF = contact frequency (events/day)

ABS<sub>o</sub> = oral absorption fraction (unitless)

ABS<sub>d</sub> = dermal absorption fraction (unitless)

F = exposure frequency (days/yr)

D = exposure duration (yrs)

CPF<sub>o</sub> = oral cancer potency factor (mg/kg-dy)<sup>-1</sup>

BW = adult body weight (kg)

AT = averaging time (days)[carcinogens (365dys/yr x 70yrs), noncarcinogens(365dys/yr x D)]

### Exposure Pathways:

In order to assess the risk to current workers, it is necessary to know who is exposed and how that exposure occurs. Aerovox supplied information about potentially exposed workers to EPA on November 20, 1997, (see Attachment A). Based on this information, EPA evaluated the potential exposures to three different types of workers currently employed at the Aerovox facility; a tank room operator, a carpenter and a pump room operator. These workers were chosen because they are expected to receive the highest exposure to PCB contaminated material remaining on surfaces.

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<sup>1</sup>McArthur, A. Dermal Measurements and Wipe Sampling Methods: A review. Appl. Occup. Env. Hyg. 7 (9): 599-605.

The Tank and Pump Room operators work in areas in which the highest levels of PCBs were found, (i.e. 2300ug/100cm<sup>2</sup> for areas in which the tank room operator works and 1230ug/100cm<sup>2</sup> for the pump room). The carpenter is exposed to all areas of the building, including contaminated ceilings, beams and floors, and their work can result in the re-suspension of PCB dust.

Only dermal contact and accidental ingestion of dust on PCB contaminated surfaces is evaluated for all receptors. The air pathway is not quantitatively evaluated due to insufficient data. Exposures for both the Central tendency (CT) and Reasonable Maximum Exposure (RME) scenarios are evaluated for each receptor. The RME is the highest exposure that could reasonably be expected to occur for a given pathway. The CT scenario represents exposure to the average receptor.

### **Exposure Assumptions:**

The exposure assumptions for a tank room operator, pump room operator and carpenter are presented in **Tables 2, 4 and 6**, respectively. Below is an explanation of values chosen for each term.

*Exposure Point Concentration (EPC)*- The exposure point concentration, (C), in the above risk equation is an estimate of the arithmetic average concentration for a contaminant based on site sampling results. An average is targeted for the exposure point concentration because it provides the best estimate of the concentration encountered from random exposures. While an individual may not actually exhibit random patterns of movement across an area, the assumption of equal time spent in different parts of an area is a simple but reasonable approach. Due to the uncertainty associated with estimating the true average, the 95% upper confidence limit of the arithmetic mean, (95%UCL), is used as a conservative estimate of the average.

#### EPC for the Tank Room Operator

Ninety percent of a tank room operator's exposure is assumed to come from "high contact" areas while 10% is assumed to come from "low contact" areas. High contact areas include tank room #1, the impregnation rack room, final test area and tank room #2. It is assumed that a tank room operator may contact all of the surfaces sampled except ceilings or beams. These include floors, doors, curtains, and equipment. Low contact areas include the cafeteria and vending machines. Surfaces in these areas which can be contacted by the tank room operator include floors, doors, tables and walls. This results in an EPC for the tank room operator as calculated below;

$$\begin{aligned}\text{Concentration (ug/100cm}^2\text{)} &= 90\%(95\%\text{UCL of high contact areas}) + 10\%(95\%\text{UCL of low contact areas}) \\ &= 90\% (294.7) + 10\% (48.8) = 271\text{ug/100cm}^2\end{aligned}$$

The calculation of 95%UCLs and the corresponding EPC for the Tank Room Operator is presented in **Table 3**.

#### EPC for the Pump Room Operator

Ninety percent of a pump room operator's exposure is assumed to come from "high contact" areas which include the pump room. It is assumed that a pump room operator may come into contact with floors, doors and walls in this room. Ten percent of a pump room operator's

exposure is assumed to come from low contact areas which include the cafeteria, locker room and hall. Surfaces which may be contacted in these areas include walls, tables and doors. This results in an EPC as calculated below;

$$\text{Concentration(ug/100cm}^2\text{)} = 90\% (656.7) + 10\%(75.3) = 599\text{ug/100cm}^2$$

The calculation of 95%UCLs and the corresponding EPC for the Pump Room Operator is presented in **Table 5**.

#### EPC for the Carpenter

Ninety percent of a carpenter's exposure is assumed to come from "high contact" areas which include the pump room, shipping dock, impregnation rack room, final test area, receiving dock, tank room #2. It is assumed that contact with all surfaces measured occurs. Ten percent of a carpenter's exposure is assumed to come from low contact areas which include the main first floor hallway, locker rooms, cafeteria, vending machines and third floor hallways and elevator. All surfaces are assumed to be contacted. This results in an EPC as is calculated below;

$$\text{Concentration(ug/100cm}^2\text{)} = 90\% (217.2) + 10\%(97.1) = 205\text{ug/100cm}^2$$

The calculation of 95%UCLs and the corresponding EPC for the Carpenter is presented in **Table 7**.

*Fraction Transferred from Surface to Skin (FTSS):* The amount transferred from a contaminated surface to the skin is dependent on the physical properties of the surface, physical parameters of the chemical and skin, and mechanical aspects of contact. Very few studies are available which describe the relationship between the amount transferred to the skin and each of these parameters. The USEPA has previously assumed a transfer rate of 0.5 for PCBs, (USEPA, 1987)<sup>2</sup> based on an Office of Toxic Substance Assessment. This value is based on transfer from smooth, nonporous surfaces, (e.g., glass and unpainted metal), so that transfer from concrete or wood surfaces is likely to be much lower. In addition, more recent studies in EPA Region III have found that a three-fold washing procedure on PCB contaminated buildings surfaces removed only 30% of the surface PCB contamination, indicating perhaps an even lower transfer efficiency than 0.5<sup>3</sup>. For the RME estimate we chose an FTSS of 0.01 for all workers. For the CT a value of 0.001 was chosen for the central tendency for all receptors based on professional judgement.

*Surface Area (SA):* The skin surface area which will come in contact with a contaminated surface will vary depending on the type of work performed. For the carpenter, it is reasonable to assume that their activities could result in the hands, arms and head being exposed to surfaces, thus a

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<sup>2</sup>USEPA. 1987. Polychlorinated Biphenyls: Spill Cleanup Policy. Final Rule. Federal Register 52 (63): 10688-10710.

<sup>3</sup>Forman, D.L. 1996. Oral and Dermal Risk Assessment: Cressona Aluminum Plant. USEPA Region III, Air, Radiation and Toxicities Division. Philadelphia, PA.

surface area of 4000cm<sup>2</sup> was assumed for the RME scenario and a value of 3000cm<sup>2</sup> was assumed for the CT. For the tank room and pump room operator it was assumed that the hands and lower arms would be exposed to surfaces. Thus a value of 2000cm<sup>2</sup> was chosen for the RME and a value of 1000cm<sup>2</sup> was chosen for the CT.

*Fraction Transferred from Skin to Mouth (FTSM):* The amount of contaminated material that travels to an individual's mouth is usually derived from the amount which is retained on the fingertips. Then hand-to-mouth activity or hand-to-food-to-mouth activity results in the material being transferred to the mouth and ingested. We assumed an FTSM of 10% for the material on the hands for the RME scenario based on a study by Michaud et al, 1994<sup>4</sup>; and a study by the New York State Department of Health, 1985<sup>5</sup>.

Ten percent of the two-palm surface area, which can range from 200 to 400cm<sup>2</sup>, averages to about 30cm<sup>2</sup>. This area is approximately equal to the area of the fingertips. For this assessment, a transfer fraction equivalent to 30cm<sup>2</sup> was estimated by multiplying the exposed surface area for each exposure scenario by the FTSM. This corresponds to an FTSM of 0.015 for the RME and 0.03 for the CT for both the tank room and pump room operators. For the carpenter this corresponds to an FTSM of 0.0075 for the RME and 0.01 for the CT. Thus the area from which the material is transferred remains a constant 30cm<sup>2</sup>.

*Contact Frequency (CF):* The frequency with which one contacts surfaces is difficult to estimate. Many assessments have assumed 1 contact per day. Michaud et al., (1994), assumed 8 contacts per day, based on professional judgement. This value has also been applied at similar sites in Regions II and III and is also chosen for the RME scenario at this site. A value of 4 was chosen for the CT based on professional judgement.

*Absorption (ABS<sub>g</sub>, ABS<sub>d</sub>):* ABS<sub>g</sub> and ABS<sub>d</sub> are variables that account for the amount of PCBs in soils absorbed systemically across the gut and skin, respectively. The amount absorbed across the gut was assumed to be 100% based on a literature review conducted by PTI, 1993.<sup>6</sup> The amount absorbed across the skin was assumed to be 14% based on a study by Wester, et al. 1993.<sup>7</sup>

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<sup>4</sup>Michaud, J.M., S.L. Huntley, R.A., Sherer, M.M, Gray, and D.J. Paustenbach, 1994. PCB and Dioxin Re-Entry Criteria for Building Surfaces and Air. *Journal of Exposure Analysis and Environmental Epidemiology*, 4(2): 197-227.

<sup>5</sup>New York State Department of Health, 1985. PCB Re-Entry Guidelines. Bureau of Toxic Substances Assessment, Division of Environmental Health Assessment. Albany, NY. July 17. Document 13301.

<sup>6</sup>Evans, C., Steele, M., Yost, L., Schoof, R. 1993. Gastrointestinal Absorption of Selected Chemicals Review of Evidence for Deriving Relative Absorption Factors, PTI Environmental Services, EPA Contract Number 68-WO-0032.

<sup>7</sup>Wester, R.C., Maibach, H.I., Sedik, L. 1993. Percutaneous absorption of PCBs in soil: In vivo rhesus monkey, in vitro human skin, and binding to powdered human stratum corneum.

*Exposure Frequency (F)*: EPA's standard default factor for number of days a worker spends at work is 250dys/yr, (USEPA, 1991.)<sup>8</sup> This represents an upper percentile of the US population, and is thus a conservative estimate of exposure frequency. This value is chosen for both the RME and CT scenarios in this assessment.

*Exposure Duration (D)*: The standard default factor for workplace duration is 25 years, (USEPA, 1991). Based on the US Bureau of Labor Statistics, 95% or higher, (depending on age), of the population works at any one place for a duration of 25 years or less. Thus this value was used for both the RME and CT scenarios.

*Toxicity Factors (CPF or RfD)*: CPF - A cancer potency factor equal to  $2 \text{ (mg/kg-dy)}^{-1}$  was applied based on the USEPA 1996 Report.<sup>9</sup> A reference dose of  $2\text{E-}05$  based on exposures to Aroclor 1254 and on a developmental endpoint was chosen. Aerovox does not report which Aroclor is measured, although Aroclors 1254, 1242 and 1016 were all used in past manufacturing efforts. The CPF of 2 applies to all Aroclors but the RfD is based on 1254. Since we do not know which Aroclor was measured, we have chosen the more conservative RfD based on exposure to 1254 for this assessment.

*Body Weight (BW)*: The standard default exposure factor for an adult male's body weight is 70 kilograms. This represents the 50th percentile of the US population, (USEPA, 1991). This value was used for both the RME and CT scenarios.

*Averaging Time (AT)*: For carcinogens, the dose is averaged over a lifetime, (i.e. 70yrs) and is expressed in days, (i.e.  $70\text{yrs} \times 365\text{dys/yr} = 25550\text{days}$ ). For noncarcinogens, the dose is averaged over the duration of exposure. For an adult worker the averaging time would be  $25\text{ years} \times 365\text{dys/yr} = 9125\text{ days}$ . This value was used for both the RME and CT scenarios.

## RISK SCREENING RESULTS

Exposure to three receptors was evaluated for the Aerovox facility; a tank room operator, a pump room operator and a carpenter. Results of the Risk Screening are shown in **Tables 8 and 9**. For a tank room operator, the incremental excess cancer risk from exposure to PCBs on accessible building surfaces is  $5 \times 10^{-4}$  for the RME scenario and  $1 \times 10^{-5}$  for the CT scenario. The noncancer hazard quotient is 33 for the RME and 0.9 for the CT scenarios. For a pump room operator, the incremental excess cancer risk from exposures to PCBs on accessible building surfaces is  $1 \times 10^{-3}$  for the RME scenario and  $3 \times 10^{-5}$  for the CT scenario. The noncancer hazard quotient is 72 for the

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Journal of Tox. And Env Health, 39: 375-82.

<sup>8</sup>USEPA. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. OSWER Directive 9285.6-03. Office of Solid Waste and Emergency Response, Washington, DC.

<sup>9</sup>USEPA. 1996. PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures. NCEA, Office of Research and Development, Washington, DC, EPA/600/P-96/011F.

RME scenario and 2 for the CT scenario. For the carpenter, the incremental excess cancer risk from exposures to PCBs on accessible building surfaces is  $7 \times 10^{-4}$  for the RME scenario and  $3 \times 10^{-5}$  for the CT scenario. The noncancer hazard quotient is 47 for the RME scenario and 1.7 for the CT scenario. EPA's target cancer risk range in the Superfund Program is  $10^{-4}$  to  $10^{-6}$  and the target hazard index is 1. The RME scenarios for all three receptors clearly exceed EPA's target risk range for both cancer and noncancer endpoints.

Corresponding target goals for surface concentrations of PCBs in the Aerovox building are presented in **Table 10**. The lowest target goal for PCBs, based on the noncancer hazard, is for a carpenter and is  $4 \mu\text{g}/100\text{cm}^2$ . If this were to be the target goal, then 38 out of 38 samples on the first floor would exceed this goal. These same 38 samples would also exceed the TSCA cleanup level of  $10 \mu\text{g}/100\text{cm}^2$ . On the second floor surfaces 48 out of 48 samples exceed both the target goal of  $4 \mu\text{g}/100\text{cm}^2$  and the TSCA goal of  $10 \mu\text{g}/100\text{cm}^2$ . On the third floor all seven samples exceed both the risk-based target level and the TSCA cleanup goal.

## UNCERTAINTIES

This section discusses the uncertainty in the current risk evaluation and in particular highlights the uncertainties of using wipe samples to estimate exposure and risk. As a result of these uncertainties, the current assessment of risk should be viewed more as a rough indicator of potential harm rather than as a prediction of the probability of the occurrence of adverse effects. Conservative but reasonable exposure assumptions have been applied such that the actual risk is unlikely to exceed that which is predicted in this assessment.

- This assessment is limited to the exposure and risk from PCBs only. This may underestimate the actual risk, based on the presence of other contaminants of concern.
- Only the oral and dermal routes of exposure are evaluated. The inhalation route was not evaluated due to the lack of adequate number of air sampling measurements. Preliminary sampling efforts conducted by Aerovox in October, 1997 indicated that inhalation of PCB contaminated dust or evaporated congeners may pose additional risks to current workers in the Aerovox facility. Future sampling efforts should include appropriate air monitoring to further evaluate the air pathway.
- PCB dioxin-like congeners were not evaluated, thus this could result in a potential underestimate of risks.
- The exposure parameters which relate the concentration on surfaces to the exposure dose include the FTSS, FTSM and CF. Very few studies exist to support default values for these parameters. The basis for each of these parameters has been described above but all are ultimately based on professional judgement. The values chosen for the above parameters are likely to be within the range of actual values but are also conservative estimates.
- The exposure point concentration that EPA typically chooses in Superfund risk assessments is the 95%UCL. The true mean is expected to be below this value 95% of the time. As one increases the number of samples, the 95%UCL should approach the true mean. Thus this value is a conservative estimate of the true mean.
- The concentrations of PCBs remaining on the surfaces were assumed to stay constant over time. This assumption could result in an overestimate of actual exposure if surface

concentrations are decreasing with time.

## TABLES

TABLE 1

## Sampling &amp; Analysis Plan

~~1ST FLOOR~~

Sample Plan No.	Aerovox Sample No.	Bottle No.	Results ug/100sqcm	Location/Comment
=====	=====	=====	=====	=====
MAIN HALLWAY FLOORS (3) & TIME CLOCK WALL (1)				
1MHF1	1634	44	67 ug	1D23 1' N. OF POLE
1MHF2	1633	43,43D	124 ug	1D28 1' N. OF POLE
1MHF3	1636	46	70 ug	6' N. OF 1D17, ON CRACK IN FL
1TCW1	1635	45	23 ug	1' N. OF TIME CLOCK X

## MENS LOCKER ROOM FLOOR (2) &amp; LOCKERS (2)

1LRF1	1606	16	63 ug	FLOOR WEST 6' FROM N. WALL
1LRF2	1605	15	42 ug	FLOOR EAST 6' FROM N. WALL
1LRL1	1603	13,13D	47 ug	LOCKER 207 EAST WALL
1LRL2	1604	14	84 ug	LOCKER 16 WEST WALL

## PUMP ROOM AREA CEILING (4), BEAMS (4), &amp; FLOOR (12)

1PRCI	1613	23	131 ug	13' N. OF 1B7
1PRC2	1608	18	34 ug	13' N. OF 1B10
1PRC3	1622	32	26 ug	10' N. OF 1D10A
1PRC4	1619	29	29 ug	7' N. OF 1D6
1PRB1	1614	24,24D	126 ug	13' N. OF 1B7
1PRB2	1609	19	95 ug	13' N. OF 1B10
1PRB3	1623	33	33 ug	10' N. OF 1D10A
1PRB4	1620	30	109 ug	7' N. OF 1D6
1PRF1	1607	17	115 ug	@ LOCKER ROOM DOORWAY AT END
1PRF2	1617	27	168 ug	@ LAB DOORWAY 2' FROM DOOR
1PRF3	1615	25	410 ug	5' FROM N. WALL

Sample Plan No.	Aerovox Sample No.	Bottle No.	Results ug/100sqcm	Location/Comment
1PRF4	1611	21	241 ug	11' FROM N. WALL
1PRF5	1616	26	430 ug	2' NW OF 1B5
1PRF6	1612	22	112 ug	3" W. OF 1B7
1PRF7	1610	20,20D	131 ug	4' E. OF 1B8
1PRF8	1618	28	930 ug	15' N. OF 1D5
1PRF9	1621	31	1230 ug	13' N. OF 1D8
1PRF10	1624	34	193 ug	11.5' N. OF 1D11B
1PRF11	1626	36	202 ug	15' N. OF 1F5
1PRF12	1625	35	71 ug	13' N. OF 1F9

#### SHIPPING DOCK (4)

1SDF1	1637	47	84 ug	14' FROM S. WALL
1SDF2	1638	48	108 ug	8' FROM N. WALL
1SDF3	1639	49	47 ug	1' FROM 3RD POLE S. END
1SDF4	1640	50	107 ug	6' FROM S. END

#### MAIN CAFETERIA FLOOR (4) & TABLES (2)

1CF1	1627	37	18 ug	10' S. OF N. WALL, FRONT OF DOOR
1CF2	1628	38	39 ug	4' S. OF N. WALL, FRONT OF DOOR
1CF3	1629	39	62 ug	11' N. OF S. WALL
1CF4	1630	40	31 ug	6' N. OF S. WALL, 7' W. OF E. WALL
1CT1	1631	42	30 ug	TABLE EAST END
1CT2	1632	41	21 ug	TABLE WEST END, TOP & SIDE

## 2ND FLOOR

Sample Plan No. =====	Aerovox Sample No. =====	Bottle No. =====	Results ug/100sqcm =====	Location/Comment =====
TANK ROOM #1 LOWER CEILING (2) AND BEAMS (2), UPPER CEILING (2) AND BEAMS (2) RIM OF IMP. TANK (1), EXT. OF IMP. TANK (3), FLOOR (10), DESK (1), AND DOOR JAM (1)				
2TRLC1	1676	86	49 ug	4' W. OF TANK #34, 15' S. OF
2TRLC2	1682	92	46 ug	15' S. OF N. WALL, BETWN TKS
2TRLCB1	1677	87	176 ug	4' W. OF TANK #34, 15' S. OF
2TRLCB2	1683	93, 93D	132 ug	15' S. OF N. WALL, BETWN TKS
2TRUC1	1680	90	45 ug	12' N. OF 2C7, 12' W. OF 2C7
2TRUC2	1678	88	52 ug	8' N. OF DOOR, 7' W. OF 2C10
2TRUCB1	1681	91, 91D	72 ug	12' N. OF 2C7, 12' W. OF 2C7
2TRUCB2	1679	89	51 ug	8' N. OF DOOR, 7' W. OF 2C10
2TRT1	1662	72	64 ug	RIM OF TANK #22
2TRET1	1663	73	55 ug	EXTERIOR OF TANK #22
2TRET2	1664	74	63 ug	EXTERIOR OF TANK #28
2TRET3	1665	75	39 ug	EXTERIOR OF TANK #16
2TRF8	1666	76, 76D	202 ug	8' FROM DOOR
2TRF2	1672	82	270 ug	7' FROM WINDOW, CENTER ISLE
2TRF3	1673	83	203 ug	12' FROM 2B7
2TRF4	1674	84	480 ug	11' W. OF 2C7, 2' FROM DOOR
2TRF5	1669	79	112 ug	11' N. OF 2B8, 3' W. OF 2B8
2TRF6	1670	80	249 ug	3' W. OF 2B8, 2' S. OF 2B8
2TRF7	1671	81	320 ug	4' N. OF 2C8, 9' W. OF 2C8
2TRF1	1675	85	890 ug	12' E. OF W. WALL
2TRF9	1667	77	247 ug	3' E. OF 2B10
2TRF10	1668	78	180 ug	8' N. OF DOOR AT 2C10

## 2ND FLOOR

Sample Plan No.	Aerovox Sample No.	Bottle No.	Results ug/100sqcm	Location/Comment
2TRD1	1661	71	59 ug	DESK, FRONT LEFT CORNER
2TRDJ1	1660	70	54 ug	DOOR JAM, BY CLIPBOARD AT 4.5

IMPREGNATION RACKS/HEAT TEST OVENS/FILL HOLE SOLDER FLOOR SAMPLES (3),  
WALL SAMPLES (2), & CURTAIN (1)

2IRF1	1657	67	190 ug	4' FROM DOOR, CENTER OF HALL
2IRF2	1658	68	2300 ug	6' N. OF 2D8, 4' W. OF 2D8
2IRF3	1654	64	76 ug	6' N. OF 2F7
2IRD1	1655	65	55 ug	DOOR TO F.T., DOOR FRAME AT 5
2IRD2	1656	66	48 ug	DOOR TO OFFICE, LEFT DOOR AT
2IRC1	1659	69	63 ug	CURTAIN TO ASSEMBLY, CENTER A

## FINAL TEST AREA FLOOR (4), &amp; WALL (1)

2FTF1	1653	63	74 ug	2' W. OF 2F5
2FTF2	1652	62,62D	88 ug	9' S. OF 2G5
2FTF3	1651	61	117 ug	9' FROM S. WALL
2FTF4	1650	60	144 ug	NEAR TR #2 DOOR
2FTD1	1649	59	67 ug	ON TR #2 DOOR JAM

## RECEIVING AREA FLOOR (3), &amp; HALL (1)

2RAF1	1641	51,51D	126 ug	WOOD FLOOR, 1.5' FROM W. WALL
2RAF2	1642	52	48 ug	WOOD FLOOR, 2' N. OF 2E41
2RAF3	1643	53	28 ug	STEEL PLATE, 2' S. OF 2E41
2RAHF1	1644	54	88 ug	HALLWAY, 12' N. OF WINDING RC

## 2ND FLOOR

Sample Plan No.	Aerovox Sample No.	Bottle No.	Results ug/100sqcm	Location/Comment
=====	=====	=====	=====	=====

## TANK ROOM #2 FLOOR (2), TANK RAIL (1), &amp; WALL (1)

2TR2F1	1646	56	159 ug	5' FROM WALL CORNER BY PHONE
2TR2F2	1647	57	115 ug	3' FROM STEPS TO TANK
2TR2R1	1648	58	54 ug	WOOD RAIL TO TNK #43
2TR2W1	1645	55	45 ug	AT CORNER BY PHONE

VENDING MACHINE ROOMS, ROOM 1 (WEST) FLOOR (1), DOOR (1), TABLE (1),  
& WALL (1), ROOM 2 FLOOR (1)

2VM1F1	1599	9	22 ug	14' E. OF W. WALL, 20' S. OF
2VM1D1	1601	11	22 ug	DOOR TO HALLWAY, W. DOOR
2VM1T1	1600	10	39 ug	TABLE BY DOOR
2VM1W1	1602	12	19 ug	WALL S. OF BULLETIN BD.
2VM2F1	1591	1	16 ug	3' S. OF 2B69, NE CORNER

## 3RD FLOOR

Sample Plan No.	Aerovox Sample No.	Bottle No.	Results ug/100sqcm	Location/Comment
=====	=====	=====	=====	=====

## HALLWAYS (5) &amp; ELEVATORS (2)

3HF1	1597	7	262 ug	0' W. OF 3E16
3HF2	1596	6	133 ug	5' S. OF 3C16
3HF3	1595	5	134 ug	4' S. OF 3C23
3HF4	1594	4	157 ug	5' S. OF 3C32
3HF5	1593	3	47 ug	5.5' S. OF 3D42
3HF6	1598	8	230 ug	WEST ELEVATOR, CENTER
3HF7	1592	2, 2D	63 ug	EAST ELEVATOR, CENTER

**TABLE 2**  
VALUES USED FOR DAILY INTAKE CALCULATIONS  
Aerovox Facility, New Bedford Harbor, MA  
Exposure Scenario for the Tank Room Operator

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Chronic Daily Intake Factor (mg/kg-dy) (g)
Ingestion	Cd	concentration of PCBs in dust from dust	ug/100cm2	271	see table 1	271	See Table 1	<b>Cancer</b>
Dermal	FTSS	fraction transferred from surface to skin	fraction - unitless	0.01	a	0.001	a	RME 8.5E-05
	SA	adult surface area	cm2	2000	b	1000	rofessional judgement	
	FTSM	fraction transferred from skin to mouth	fraction - unitless	0.015	a	0.030	a	CT 2.3E-08
	CF	contact frequency	events/dy	8	prof judge	4	prof judge	
	ABSo	oral absorption fraction	fraction - unitless	1	c	1	b	<b>Noncancer</b>
	F	exposure frequency	dys/yr	250	site-specific	250	site-specific	RME 2.4E-04
	D	exposure duration	yrs	25	c	25	c	
	CPFo	Oral Cancer Potency Factor	(mg/kg-dy)-1	2	d	1	d	CT 6.5E-08
	BW	adult body weight	kg	70	c	70	c	
	AT	averaging time (carcinogen) (noncarcinogen)	days	25550 10950	c c	25550 10950	c c	
	RfDo	oral reference dose	mg/kg-dy	2E-005	IRIS, 97	2E-005	IRIS, 1997	
	ABSd	dermal absorption from dust	fraction - unitless	0.14	e	0.14	e	
	cf	conversion factor	mg/ug	0.001	-	0.001	-	

a - USEPA(1996). Oral and Dermal Risk Assessment Final, Cressona, Aluminum Plant, Cressona, PA, From Debra Forman, PhD

Industrial Domain Section, Region 3, Philadelphia, PA.

b - PTI Environmental Services. (1993). Gastrointestinal Absorption of Selected Chemicals. Review of Evidence for Deriving Relative Absorption Factors. EPA Contract # 68-WO-0032.

c - USEPA (1993) Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure. Draft. November.

d - USEPA (1996). PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures, National Center for Environmental Assessment, Office of Research and Development, Washington, DC, EPA/600/P-96-001F.

e - Wester, R., Mailbach, H., Sedik, L., and J. Melendres (1983). Percutaneous Absorption of PCBs from Soil: In Vivo Rhesus Monkey, In Vitro Human Skin, and binding to Powdered Human Stratum Corneum, Journal of Toxicology and Env. Health, 39: 375-382.

f- represents 90% x UCL of Hi exposure areas + 10% x UCL of low exp. areas

g - Intake Factor (mg/kg-dy) = [cf x FTSS x SA x FTSM x CF x ABSo x F x D/BW x AT] + [cf x FTSS x SA x (1-FTSM) x CF x ABSd x F x D/BW x AT]

TABLE 3  
CALCULATION OF 95%UCL

TANK ROOM OPERATOR

Most frequented areas: (Tank room 1, impregnation rack room, final test area and  
and tank room 2)

Concentration*	LN	mean	sd	sd2	n	Hstat	UCL
64	4.158883	4.891547	0.901676	0.813	30	2.322	294.7
55	4.007333						
63	4.143135						
39	3.663562						
202	5.308268						
270	5.598422						
203	5.313206						
480	6.173786						
112	4.718499						
249	5.517453						
320	5.768321						
890	6.791221						
247	5.509388						
180	5.192957						
159	5.068904						
154	5.036953						
190	5.247024						
2300	7.740664						
76	4.330733						
55	4.007333						
48	3.871201						
63	4.143135						
74	4.304065						
88	4.477337						
117	4.762174						
144	4.969813						
67	4.204693						
159	5.068904						
115	4.744932						
54	3.988984						
45	3.806662						

\*Includes all samples collected from surfaces except those samples collected from ceilings or beams. No samples reported ND.

Less frequented areas: (cafeteria and vending machines on 2nd floor)

Conc	LN	Mean	sd	sd2	n	Hstat	UCL
18	2.890372	3.485681	0.494527	0.2445	14	2.05	48.8
39	3.663562						
62	4.127134						
31	3.433987						
30	3.401197						
21	3.044522						
22	3.091042						
22	3.091042						
39	3.663562						
19	2.944439						
16	2.772589						
63	4.143135						
42	3.73767						
47	3.850148						
84	4.430817						

$$\text{UCL tank room operator} = (294.7)(0.9) + (48.8)(0.1) = 271$$

**TABLE 4**  
Aerovox Facility, New Bedford Harbor, MA  
Exposure Scenario for the Pump Room Operator

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Chronic Daily Intake Factor (g) (mg/kg-dy)
Ingestion + Dermal	Cd	concentration of PCBs in dust from wipe	ug/100cm2	599	see table 1	599	See Table 1	Cancer
	FTSS	fraction transferred from surface to skin	fraction - unitless	0.01	a	0.001	a	RME 8.5E-05
	SA	adult surface area	cm2	2000.00	b	1000	rofessional judgement	
	FTSM	fraction transferred from skin to mouth	fraction - unitless	0.015	a	0.030	a	CT 2.3E-06
	CF	contact frequency	events/dy	8	prof judge	4	prof judge	
	ABSo	oral absorption fraction	fraction - unitless	1	c	1	b	Noncancer
	F	exposure frequency	dys/yr	250	site-specific	250	site-specific	
	D	exposure duration	yrs	25	c	25	c	RME 2.4E-04
	CPFo	Oral Cancer Potency Factor	(mg/kg-dy)-1	2	d	1	d	
	BW	adult body weight	kg	70	c	70	c	CT 6.5E-06
	AT	averaging time (cancer)	days	25550	c	25550	c	
		(noncancer)		10950	c	10950	c	
	RfDo	oral reference dose	mg/kg-dy	2E-005	IRIS, 97	2E-005	IRIS, 1997	
	ABSd	dermal absorption from dust	fraction - unitless	0.14	e	0.14	e	
	cf	conversion factor	mg/ug	1.0E-003	-	1.0E-003	-	

a - USEPA(1996). Oral and Dermal Risk Assessment Final, Cressona, Aluminum Plant, Cressona, PA. From Debra Forman, PhD  
Industrial Domain Section, Region 3, Philadelphia, PA.

b - PTI Environmental Services. (1993). Gastrointestinal Absorption of Selected Chemicals, Review of Evidence for Deriving Relative Absorption Factors. EPA Contract # 68-WO-0032.

c - USEPA (1993) Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure. Draft, November.

d - USEPA (1996). PCBs. Cancer Dose-Response Assessment and Application to Environmental Mixtures, National Center for Environmental Assessment, Office of Research and Development, Washington, DC, EPA/600/P-96-001F.

e - Wester, R., Maibach, H., Sedik, L., and J. Melendres (1993). Percutaneous Absorption of PCBs from Soil. In Vivo Rhesus Monkey, In Vitro Human Skin, and binding to Powdered Human Stratum Corneum, Journal of Toxicology and Env. Health, 39: 375-382

f- represents 90% x UCL of Hi exposure areas + 10% x UCL of low exp. areas

g - Intake Factor (mg/kg-dy) = [cf x FTSS x SA x FTSM x CF x ABSo x F x D/BW x AT] + [cf x FTSS x SA x (1-FTSM) x CF x ABSd x F x D/BW x AT]

# **Calculation of 95%UCL**

## **Pump Room Operator**

### **Pump Room (Most Frequented Areas)**

Conc (ug/100cm2)*	LN	mean	SD	SD2	N	Hstat	UCL
115	4.744932	5.484244	0.832086	0.692	12	2.62	656.7
168	5.123964						
410	6.016157						
241	5.484797						
430	6.063785						
112	4.718499						
131	4.875197						
930	6.835185						
1230	7.114769						
193	5.26269						
202	5.308268						
71	4.26268						

\*Includes all samples collected from surfaces except those samples collected from ceilings or beams. No samples reported NDs.

### **Cafeteria, Locker room, Hall (Less frequented areas)**

Conc (ug/100cm2)*	LN	mean	SD	SD2	N	Hstat	UCL
18	2.890372	3.845847	0.534751	0.2859	13	2.155	75.3
39	3.663562						
62	4.127134						
31	3.433987						
30	3.401197						
21	3.044522						
63	4.143135						
42	3.73767						
47	3.850148						
84	4.430817						
67	4.204693						
124	4.820282						
70	4.248495						

\*Includes all samples collected from surfaces except those samples collected from ceilings or beams. No samples reported NDs.

UCLpump room operator = 90% x 95UCL for most frequented areas + 10% x 95%UCL for less frequented areas.

$$\begin{aligned}
 &= (656.7)(0.9) + (75.3)(0.1) \\
 &= 591.0 + 7.5 = 598.6
 \end{aligned}$$

TABLE 6

VALUES USED FOR DAILY INTAKE CALCULATIONS

Aerovox Facility, New Bedford Harbor, MA

Exposure Scenario for the Carpenter

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Chronic Daily Intake Factor Mg/Kg-dy (G)
Ingestion + Dermal	Cd	concentration of PCBs in dust from wipe	ug/100cm <sup>2</sup>	205	see table 1	205	See Table 1	Cancer
	FTSS	fraction transferred from surface to skin	fraction - unitless	0.01	a	0.0010	a	RME 1.6E-04
	SA	adult surface area	cm <sup>2</sup>	4000.00	b	3000.00	professional judgement	
	FTSM	fraction transferred from skin to mouth	fraction - unitless	0.0075	a	0.01	a	CT 6.2E-06
	CF	contact frequency	events/dy	8.00	prof judge	4	prof judge	
	ABSo	oral absorption fraction	fraction - unitless	1.00	c	1.00	b	
	F	exposure frequency	dys/yr	250.00	site-specific	250.00	site-specific	Noncancer
	D	exposure duration	hrs	25.00	c	25.00	c	
	CPFo	Oral Cancer Potency Factor	(mg/kg-dy) <sup>-1</sup>	2.00	d	1.00	d	RME 4.6E-04
	BW	adult body weight	kg	70.00	c	70.00	c	
	AT	averaging time (carcinogen)	days	25550.00	c	25550.00	c	CT 1.7E-05
		(noncarcinogen)		10950.00	c	10950.00	c	
	cf	conversion factor	mg/ug	0.001	-	0.001	-	
	RfDo	oral reference dose	mg/kg-dy	2.00E-005	IRIS, 97	2.00E-005	IRIS, 1997	
	ABSD	dermal absorption from dust	fraction - unitless	0.14	e	0.14	e	

a - USEPA(1996). Oral and Dermal Risk Assessment Final, Cressona, Aluminum Plant, Cressona, PA, From Debra Forman, PhD

Industrial Domain Section, Region 3, Philadelphia, PA.

b - PTI Environmental Services. (1993). Gastrointestinal Absorption of Selected Chemicals, Review of Evidence for Deriving Relative Absorption Factors. EPA Contract # 68-WO-0032

c - USEPA (1993) Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure. Draft. November.

d - USEPA (1996). PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures, National Center for Environmental Assessment, Office of Research and Development, Washington, DC. EPA/600/P-96-001F.

e - Wester, R., Mailbach, H., Sedik, L., and J. Melendres (1993). Percutaneous Absorption of PCBs from Soil: In Vivo Rhesus Monkey, in Vitro Human Skin, and binding to Powdered Human Stratum Corneum. Journal of Toxicology and Env. Health, 39: 375-382.

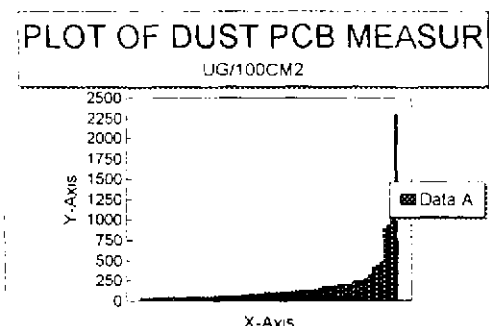
f - represents 90% x UCL of Hi exposure areas + 10% x UCL of low exp. areas

g - Intake Factor (mg/kg-dy) = [cf x FTSS x SA x FTSM x CF x ABSo x F x D/BW x AT] + [cf x FTSS x SA x (1-FTSM) x CF x ABSd x F x D/BW x AT]

TABLE 7  
CALCULATION OF 95%UCL  
Carpenter

Most Frequented areas: includes all surfaces from ceilings, floors, beams, in 1st floor pump room shipping dock, Impregnation rackroom, final test area, receiving dock, tank room #2

Conc (ug/100cm2)	LN of Conc	MEAN	sd	SD2	N	h	STAT	UCL
26	3.258097	4.715039	0.919334	0.845175	67	2	196	217.2
28	3.332205							
29	3.367296							
33	3.496508							
34	3.526361							
39	3.663562							
45	3.806662							
45	3.806662							
46	3.828641							
47	3.850148							
48	3.871201							
48	3.871201							
49	3.89182							
51	3.931826							
52	3.951244							
54	3.988984							
54	3.988984							
55	4.007333							
55	4.007333							
59	4.077537							
63	4.143135							
63	4.143135							
64	4.158883							
67	4.204693							
71	4.26268							
72	4.276666							
74	4.304065							
76	4.330733							
84	4.430817							
88	4.477337							
88	4.477337							
95	4.553877							
107	4.672829							
108	4.682131							
109	4.691348							
112	4.718499							
112	4.718499							
115	4.744932							
115	4.744932							
117	4.762174							
126	4.836282							
126	4.836282							
131	4.875197							
131	4.875197							
132	4.882802							
144	4.969813							
159	5.068904							
168	5.123964							
176	5.170484							
180	5.192957							
190	5.247024							
193	5.26269							
202	5.308268							
202	5.308268							
203	5.313206							
241	5.484797							
247	5.509388							
249	5.517453							
270	5.598422							
320	5.768321							
410	6.016157							
430	6.063785							
480	6.173786							
890	6.791221							
930	6.835185							
1230	7.114769							
2300	7.740664							



Less frequented areas: includes main hallway (floor #1), locker room, main cafeteria, vending machines and 3rd floor hallways and elevator.

<u>Conc (ug/100cm2)</u>	<u>LN of Conc</u>	<u>MEAN</u>	<u>sd</u>	<u>SD2</u>	<u>N</u>	<u>h STAT</u>	<u>UCL</u>
67	4.2	4.0	0.79	0.624	25	2.254	97.1
124	4.8						
70	4.2						
63	4.1						
42	3.7						
47	3.9						
84	4.4						
18	2.9						
39	3.7						
62	4.1						
31	3.4	<div> <div>UCLcarpenter = 90% more frequented areas + 10% less frequented areas</div> <div>= (0.9x217.2) + (0.1 x 97.1)</div> <div>= 205.2</div> </div>					
30	3.4						
21	3.0						
22	3.1						
22	3.1						
39	3.7						
19	2.9						
16	2.8						
262	5.6						
133	4.9						
134	4.9						
157	5.1						
47	3.9						
230	5.4						
63	4.1						

**TABLE 8**  
**CALCULATION OF CANCER RISKS**  
**INGESTION AND DERMAL EXPOSURES**  
**AEROVOX FACILITY, NEW BEDFORD, MA**

Exp Pt. Conc. RME ug/cm2	Exp Pt. Conc. CT ug/cm2	CDI RME (mg/kg-dy)	CDI CT (mg/kg-dy)	CPF (mg/kg-dy)-1	Cancer Risk RME	Cancer Risk CT	
Tank Room Operator							
2.71	2.71	8.5E-005	2.3E-006		2	5E-004	1E-005
Carpenter							
2.05	2.05	1.6E-004	6.2E-006		2	7E-004	3E-005
Pump Room Operator							
5.986	5.986	8.5E-005	2.3E-006		2	1E-003	3E-005

NOTES: Exp. pt conc - exposure pt concentration, equal to 10% x 95UCL of less frequented areas + 90% x 95UCL of more frequented areas.

CDI = chronic daily intake, see table 4.1-4.3

CPF = cancer slope factor, from IRIS 1/98

RME - reasonable maximum exposure

CT - central tendency exposure

**TABLE 9**  
**CALCULATION OF NONCANCER HAZARDS**  
**INGESTION AND DERMAL EXPOSURE**  
**AEROVOX FACILITY, NEW BEDFORD, MA**

Exp Pt. Conc. RME ug/cm2	Exp Pt. Conc. CT ug/cm2	CDI RME (mg/kg-dy)	CDI CT (mg/kg-dy)	RfD mg/kg-dy	Hazard Index RME	Hazard Index CT
<b>Tank Room Operator</b>						
2.71	2.71	2.4E-004	6.5E-006	2E-005	32.5	0.9
<b>Carpenter</b>						
2.05	2.05	4.6E-004	1.7E-005	2E-005	47.2	1.7
<b>Pump Room Operator</b>						
5.986	5.986	2.4E-004	6.5E-006	2E-005	71.8	1.9

NOTES: Exp. pt conc - exposure pt concentration, equal to 10% x 95UCL of less frequented areas + 90% x 95UCL of more frequented areas.

CDI = chronic daily intake, see table 4.1-4.3

RfD = Reference Dose

RME - reasonable maximum exposure

CT - central tendency exposure

TABLE 10  
 TARGET GOALS  
RISK/HAZARD CALCULATIONS  
Oral + Dermal exposures (ug/100cm2)

Reference Risk/Hazard Level	Tank Room Operator	Carpenter	Pump Room Operator
1x10-6	0.5	0.3	0.6
1x10-5	5	3	6
1x10-4	50	30	60
HQ = 1	8	4	8

## **ATTACHMENT A**

Jellinek, Schwartz & Connolly, Inc.

1525 Wilson Boulevard, Suite 600  
Arlington, VA 22209  
(703) 527-1670 • Fax: (703) 527-5477



Consultants in Environmental Science, Policy & Management

**MEMORANDUM**

**TO:** Marianne Milette  
**FROM:** Katinka van der Jagt  
**DATE:** November 20, 1997  
**SUBJECT:** Follow Up EPA's Meeting With Aerovox On 11/12

During a November 12, 1997, meeting between Aerovox and EPA Region 1 officials, Aerovox was asked by Marianne Milette (EPA) to address five questions relating to potential exposure of Aerovox employees to polychlorinated biphenyls (PCBs). This memorandum responds to the five questions.

Q1) What type of worker would be the most potentially exposed to PCBs in the current Aerovox environment?

A1) Tank Room Operator, Pump Room Operator, Carpenter, and Mechanic, would be the most potentially exposed. The reason for exposure for the Tank Room Operator and Pump Room Operator is that they work in an area where the highest levels of PCB contamination were found. The reason for exposure for the Carpenter and the Mechanic is the type of work they perform. Their work potentially causes re-suspension of PCB contamination and during the performance of their job, surfaces are contacted more frequently. They may at times contact surfaces as ceilings, ceiling beams, and floors.

Q2) What group of individuals make up this category?

*Handwritten note:* Tank Room Operator

MEMBERS OF THE JSC GROUP OF COMPANIES

Jellinek, Schwartz & Connolly, Inc. • Arlington, VA 22209 USA • (703) 527-1670 • Fax (703) 527-5477  
JSC International Ltd. • Harrogate, North Yorkshire HG1 5QY • UK • (1423) 520245 • Fax (1423) 520297  
Stelken, Inc. • Bryan, TX 77802 USA • (409) 846-5175 • Fax (409) 846-2671  
JSC/Spensley • Denver, CO 80202 USA • (303) 623-3100 • Fax (303) 623-1130

A2)

15/25  
12/25

Does Yr  
men / 1  
weeks

Job Title	Sex	Age Range in Years	Employment Period in Years	Number of Employees	Days per Week
Tank Room Operator	Males	35 - 55	10 - 15	4 per shift, 7 days per week	3
Pump Room Operator	Males	35 - 55	10 - 15	1 per shift, 7 days per week	3
Mechanic	Males	30 - 35 (one employee = 25)	10 - 15	4 employees, 5 days per week	1
Carpenter	Males	45 - 50	15 - 20	2-1 per day, 5 days per week	1

Q3) Describe the clothing they wear on a typical workday.

A3)

Tank Room Operator: safety shoes, cotton gloves, uniform, safety glasses  
 Pump Room Operator: safety shoes, cotton gloves, uniform, safety glasses  
 Mechanic: safety shoes, cotton gloves (occasional), uniform, safety glasses  
 Carpenter: safety shoes, uniform, safety glasses

The uniforms are put on, worn, and taken off at the plant and laundered. Cotton gloves are usually changed or replaced 1-3 times a day.

Q4) How much time of this worker's day is spent in each room of the facility.

A4)

Tank Room Operator: 7 hours in the tank room, 30 minutes in the cafeteria, 30 minutes on miscellaneous activities (going for a walk, running errands etc.)  
 Pump Room Operator: 7 hours in the pump room, 30 minutes in the cafeteria, 30 minutes on miscellaneous activities  
 Mechanic: 1 mechanic spends 4 hours in the pump room, while the other mechanics perform duties throughout the building, all of them spend 3 hours in the machine-repair shop, 30 minutes on miscellaneous activities  
 Carpenter: 3.5 hours in the mechanic shop, 3.5 hours performing duties throughout the building, 30 minutes in the cafeteria, 30 minutes on miscellaneous activities

4 hrs  
30 min  
miscellaneous

Q5) Describe their activities in each room.

A5) See the attached activity description in Table.

Job Title	Activity	Time (hours)	Notes
Tank Room Operator tank room	Capacitors are received in baskets that have been placed on carts for transportation. By use of a chain fall or air operated hoist the baskets are lifted and placed inside of the impregnation tank. Cotton gloves are worn. During the impregnation cycle valves are normally opened and closed at the rate of 2 times per hour (no gloves are worn). At the end of impregnation cycle the impregnated capacitors are removed and placed onto trays in the same manner as loading (cotton gloves). The excess oil is removed from the inside of the tank with a squeegee.	2	Handling materials in baskets (clean capacitors to be impregnated).
		1	Paperwork.
		4	Working around tank: loading, unloading, open and close valves.
cafeteria	Eating lunch.	0.5	-
miscellaneous	Going for a walk, running errands etc.	0.5	-
Pump Room Operator pump room	Pump room operator stays in the pump room area and services the vacuum pumps as required. Opening valves starting and stopping pumps as per tank requirements. There are 35 vacuum pumps. The operator also lubricates the pumps and maintains the pumps as required.	7	Some paper work at desk, managing pumps, setting valves.
		0.5	-
		0.5	-
cafeteria	Eating lunch.	0.5	-
miscellaneous	Going for a walk, running errands etc.	0.5	-
Mechanic pump room	Normal equipment repairs, installation, pump repair, works throughout plant. Preventive maintenance on all equipment.	4	Pump room maintenance by 1 of the mechanics, the remaining 3 work in other areas of the plant, rotating schedule
		3.0	-
shop	All other miscellaneous shop functions, reading materials, ordering materials, delivering to sites, work in shop.		
cafeteria	Eating lunch.	0.5	-
miscellaneous	Going for a walk, running errands etc.	0.5	-
Carpenter throughout building	Normal carpentry duties and equipment, would occasionally repair floors, walls, ceilings, etc.	3.5	25% of time is spent on destruction, 75% of time is spent on construction with new materials.
		3.5	-
shop	All other miscellaneous shop functions, reading materials, ordering materials, delivering to sites, work in shop.		
cafeteria	Eating lunch.	0.5	-
miscellaneous	Going for a walk, running errands etc.	0.5	-